

Amendments to the Claims

This listing of claims will replace all prior versions, and listings, of claims in the above-captioned application.

Please cancel claims 16 and 31 without prejudice.

Listing of Claims:

1.-5. (Cancelled)

6. (Currently amended) A solid titanium catalyst for homo-polymerization and co-polymerization of ethylene, wherein the catalyst is ~~produced by~~ prepared by a method comprising:

preparing a magnesium compound solution by contacting a magnesium halide compound with an alcohol;

preparing a second solution by reacting the magnesium compound solution with an ester compound and a first silicon compound, wherein the first silicon compound comprises a silicon compound having an alkoxy group; and

reacting the second solution with a mixture of a titanium compound and a second silicon compound to produce the solid titanium catalyst, the second silicon compound comprising a silicon halide.

7. (Previously presented) The solid titanium catalyst of claim 6, wherein the produced solid titanium catalyst is further reacted with a second titanium compound.

8. (Previously presented) The solid titanium catalyst of claim 6, wherein the ester compound comprises an ester compound having at least one hydroxy group.
9. (Previously presented) The solid titanium catalyst of claim 6, wherein the ester compound comprises an unsaturated aliphatic ester having at least one hydroxy group.
10. (Previously presented) The solid titanium catalyst of claim 6, wherein the ester compound comprises 2-hydroxy ethylacrylate, 2-hydroxy ethylmethacrylate, 2-hydroxy propyl acrylate, 2-hydroxy propylmethacrylate, 4-hydroxy butylacrylate, or pentaerithritol triacrylate.
11. (Previously presented) The solid titanium catalyst of claim 6, wherein the ester compound comprises an aliphatic monoester having at least one hydroxy group or an aliphatic polyester having at least one hydroxy group.
12. (Previously presented) The solid titanium catalyst of claim 6, wherein the ester compound comprises 2-hydroxy ethyl acetate, methyl 3-hydroxy butylate, ethyl 3-hydroxy butylate, methyl 2-hydroxy isobutylate, ethyl 2-hydroxy isobutylate, methyl 3-hydroxy-2-methyl propionate, 2,2-dimethyl-3-hydroxy propionate, ethyl-6-hydroxy hexanoate, t-butyl-2-hydroxy isobutylate, diethyl-3-hydroxy glutarate, ethyllactate, isopropyl lactate, butyl-isobutyl lactate, isobutyl lactate, ethyl mandelate, dimethyl ethyl tartrate, ethyl tartrate, dibutyl tartrate, diethyl citrate, triethyl citrate, ethyl-2-hydroxy-caproate, or diethyl *bis*-(hydroxymethyl) malonate.
13. (Previously presented) The solid titanium catalyst of claim 6, wherein the ester compound comprises an aromatic ester having at least one hydroxy group.
14. (Currently amended) The solid titanium catalyst of claim 6, wherein the ester compound comprises 2-hydroxy ethyl benzoate, 2-hydroxy ethyl salicylate, methyl-4-(hydroxy methyl)

benzoate, methyl-4-hydroxy benzoate, ethyl-3-hydroxy benzoate, 4-methyl salicylate, ethyl salicylate, phenyl salicylate, ~~propyl-4-hydroxy benzoate~~ propyl-4-hydroxy benzoate, phenyl-3-hydroxy naphthanoate, monoethylene glycol monobenzoate, diethylene glycol benzoate, or triethylene glycol monobenzoate.

15. (Previously presented) The solid titanium catalyst of claim 6, wherein the ester compound comprises an alicyclic ester having at least one hydroxy group.

16. (Cancelled)

17. (Previously presented) The solid titanium catalyst of claim 6, wherein the first silicon compound comprises the general formula $R^1_nSi(OR^2)_{4-n}$, wherein R^1 comprises a hydrocarbon having between 1 to 12 carbons, wherein R^2 comprises a hydrocarbon having between 1 to 12 carbons, and wherein n comprises an integer between 0 and 3.

18. (Previously presented) The solid titanium catalyst of claim 6, wherein the first silicon compound comprises dimethyldimethoxy silane, dimethyldiethoxy silane, diphenyldimethoxy silane, methylphenyldimethoxy silane, diphenyldiethoxy silane, ethyltrimethoxy silane, vinyltrimethoxy silane, methyltrimethoxy silane, phenyltrimethoxy silane, methyltriethoxy silane, ethyltriethoxy silane, vinyltriethoxy silane, butyltriethoxy silane, phenyltriethoxy silane, ethyltriisopropoxy silane, vinyltributoxy silane, ethylsilicate, butylsilicate, or methyltriaryloxy silane.

19. (Previously presented) The solid titanium catalyst of claim 6, wherein the titanium compound comprises the general formula $Ti(OR)_aX_{4-a}$, wherein R comprises an alkyl group with 1 to 20 carbon atoms, wherein X comprises a halogen atom, and wherein a comprises an integer between 0 and 4.

20. (Previously presented) The solid titanium catalyst of claim 6, wherein the titanium compound comprises a titanium tetrahalide, wherein the titanium tetrahalide comprises TiCl_4 , TiBr_4 , or TiI_4 .
21. (Previously presented) The solid titanium catalyst of claim 6, wherein the titanium compound comprises an alkoxy-titanium trihalide, wherein the alkoxy-titanium trihalide comprises $\text{Ti}(\text{OCH}_3)\text{Cl}_3$, $\text{Ti}(\text{OC}_2\text{H}_5)\text{Cl}_3$, $\text{Ti}(\text{OC}_2\text{H}_5)\text{Br}_3$, or $\text{Ti}(\text{O}(\text{i-C}_4\text{H}_9))\text{Br}_3$.
22. (Previously presented) The solid titanium catalyst of claim 6, wherein the titanium compound comprises an alkoxy-titanium dihalide, wherein the alkoxy-titanium dihalide comprises $\text{Ti}(\text{OCH}_3)_2\text{Cl}_2$, $\text{Ti}(\text{OC}_2\text{H}_5)_2\text{Cl}_2$, $\text{Ti}(\text{OC}_2\text{H}_5)_2\text{Br}_2$, or $\text{Ti}(\text{O}(\text{i-C}_4\text{H}_9))_2\text{Cl}_2$.
23. (Previously presented) The solid titanium catalyst of claim 6, wherein the titanium compound comprises a tetraalkoxy-titanium compound, wherein the tetraalkoxy-titanium compound comprises $\text{Ti}(\text{OCH}_3)_4$, $\text{Ti}(\text{OC}_2\text{H}_5)_4$, or $\text{Ti}(\text{OC}_4\text{H}_9)_4$.
24. (Previously presented) The solid titanium catalyst of claim 6, wherein the second silicon compound comprises the general formula $\text{R}_n\text{SiCl}_{4-n}$, wherein R comprises hydrogen, or R comprises an alkyl group, an alkoxy group, a haloalkyl group, or an aryl group having 1 to 10 carbon atoms, or R comprises a halosilyl group or a halosilyl alkyl group having 1 to 8 carbon atoms, and wherein n comprises an integer between 0 and 4.
25. (Previously presented) The solid titanium catalyst of claim 6, wherein the second silicon compound comprises silicon tetrachloride.
26. (Previously presented) The solid titanium catalyst of claim 6, wherein the second silicon

compound comprises a trichlorosilane, wherein the trichlorosilane comprises methyltrichlorosilane, ethyltrichlorosilane, or phenyl-trichlorosilane.

27. (Previously presented) The solid titanium catalyst of claim 6, wherein the second silicon compound comprises a dichlorosilane, wherein the dichlorosilane comprises dimethyldichlorosilane, diethyldichlorosilane, diphenyldichlorosilane, or methylphenyldichlorosilane.

28. (Previously presented) The solid titanium catalyst of claim 6, wherein the second silicon compound comprises trimethylchlorosilane.

29. (Previously presented) The solid titanium catalyst of claim 6, wherein the ester compound comprises 2-hydroxyethyl methacrylate, wherein the first silicon compound comprises silicon tetraethoxide, wherein the titanium compound comprises titanium tetrachloride, and wherein the second silicon compound comprises silicon tetrachloride.

30. (Currently amended) A method for producing a solid titanium catalyst, comprising:

preparing a magnesium compound solution by contacting a magnesium halide compound with an alcohol;

preparing a second solution by reacting the magnesium compound solution with an ester compound and a first silicon compound, wherein the first silicon compound comprises a silicon compound having an alkoxy group; and

reacting the second solution with a mixture of a titanium compound and a second silicon compound to produce the solid titanium catalyst, the second silicon compound

comprising a silicon halide.

31. (Cancelled)

32. (Currently amended) The solid titanium catalyst of claim 6, wherein an amount of the mixture of the titanium compound and the second silicon compound is about 0.1 moles per mole of the magnesium halide compound to about 200 moles per mole of the magnesium halide compound, and wherein a molar ratio of the titanium compound to the second silicon compound in the mixture is between about 0.05 and about 0.95.